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September 15, 1993

Secretary
Federal Communications Commission
Washington, D. C. 20554

Re: PETITION FOR RULE MAKING BY GENERAL MOTORS RESEARCH CORPORATION - REPLY TO STATEMENTS BY VORAD SAFETY SYSTEMS, INC.

Attached is an original and nine copies of our Reply Comments to VORAD with regard to our Petition for Rule Making, RM-8308.

Should you have any questions or require additional information, please contact the writer at the above address. My telephone and facsimile numbers are also provided for your convenience.

Sincerely,

Lois A. Williams
Vice President

Copies: Richard Engelman, Chief, Technical Standards Branch
John Reed, Engineer, Technical Standards Branch
Thomas Stanley, Chief Engineer, Engineering & Tech.

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Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:

Amendment of the Rules to Permit)	RM-8308
Use of the Band 76-77 GHz for)	
Vehicle radar Systems)	

Responses to Comments of VORAD Safety Systems, Inc.

General Motors Research Corporation ("GM") hereby responds to the following key points raised by VORAD Safety Systems, Inc., in its comments on the GM petition for use of the band 76-77 GHz for vehicle radar systems.

VORAD Position: Rulemaking is premature - broader analysis necessary.

GM believes that the FCC is best suited to determine what and how much it must consider before beginning a rulemaking. GM will agree to assist the FCC in such work upon request.

VORAD Position: The shared goal of reducing antenna size, says little about the most appropriate permanent spectrum allocation.

GM does not believe that it must prove that 76-77 GHz is the one most appropriate frequency band and it challenges any company to argue that one particular frequency is the most appropriate frequency band. GM envisions that the FCC would allow use of more than one frequency band for vehicle radar above 40 GHz.

VORAD Position: GM has selected the 76-77 GHz spectrum solely because it desires to produce a common product for both its U.S. and European markets.

GM considered 60 GHz, 76 GHz and 94 GHz. Sixty GHz was rejected because it did not enable sufficient antenna aperture reduction - the aperture dimensions for the beamwidth chosen were too large to be blended with the design of future cars. Ninety-four GHz was rejected for two reasons. First, it was felt that Defense and other national security activities would object to use of that frequency. Second, the cost of transceiver components at 94 GHz would be more than at lower frequencies. Gm chose 76 GHz for several reasons. First, it enabled substantial reduction in antenna aperture from the 60 GHz system that GM had previously developed. Second, there are only two existing users at that frequency and both of those had only one equipment in operation. Thus, there is little reason for others to oppose use of this frequency. Third, RF component manufacturers are already developing RF components at 76 GHz, thus the cost of such components will be less than if another neighboring frequency had been chosen. Fourth, since the entire European community is concentrating on 76 GHz, GM could minimize its development investment and minimize per-unit cost in production by building one RF unit for both U.S. and European customers. Minimizing per-unit production cost is certainly in the interest of the U.S. public.

VORAD Position: GM petition does not explore other band locations.

GM is not required to make an assessment of other possible locations.

VORAD Position: Current experimental licenses may demonstrate advantages of other bands.

GM believes that 76-77 GHz is the minimum viable frequency due to antenna size considerations. With respect to VORAD's comment about the Japanese plan to use 60 GHz, GM believes that such radars will be at a competitive disadvantage versus radars at 76 GHz. Further, the size of the European vehicle market is approximately the same as the U.S. It would be foolish to fail to take this into account when determining a suitable frequency for use in the U.S.

VORAD Position: Transmitter at lower frequency would cost "orders of magnitude" less to produce.

An order of magnitude is a multiple of 10. "Orders of magnitude" implies a minimum of two orders of magnitude or a multiple of 100. GM challenges VORAD to show that the cost of a transmitter (actually, a transceiver for an FMCW system) at 76.5 GHz would cost at least 100 times more than a transceiver at 60 or 24 GHz.

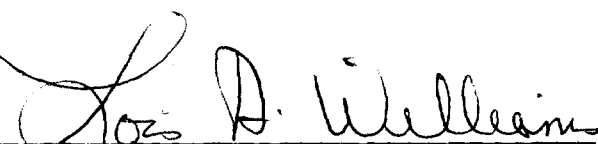
VORAD Position: GM's petition ignores acceptance of all interference

VORAD's statement appears to say that, under Part 15, vehicle radar safety systems must accept all interference and that accepting all interference may be ill-advised with respect to the next generation of radar systems. Actually, GM's radar does address this fundamental issue because its FMCW modulation and data processing scheme render it virtually impervious to outside interference. Therefore, the GM radar can co-exist with other transmitters in the 76-77 GHz band. Pulsed systems will probably be much more susceptible to outside interference than GM's FMCW system.

CERTIFICATE OF SERVICE

**THE UNDERSIGNED HEREBY CERTIFIES THAT COPIES OF THE FOREGOING
REPLY COMMENTS OF GENERAL MOTORS RESEARCH CORPORATION HAVE
BEEN MAILED BY UNITED STATES MAIL THIS 15TH DAY OF SEPTEMBER, 1993,
TO THE FOLLOWING:**

**Roger L. May
Mark Mollon
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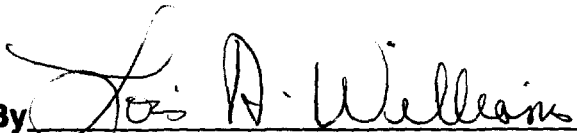
By 
Lois A. Williams, Vice President

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TO THE FOLLOWING:

**Susan Wing
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Washington, D. C. 20004-1109**

By 
Lois A. Williams, Vice President